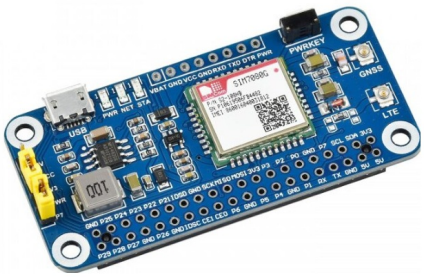

Spireon SIMBA2 CAT-M Wireless Communication Device User Manual

Contents

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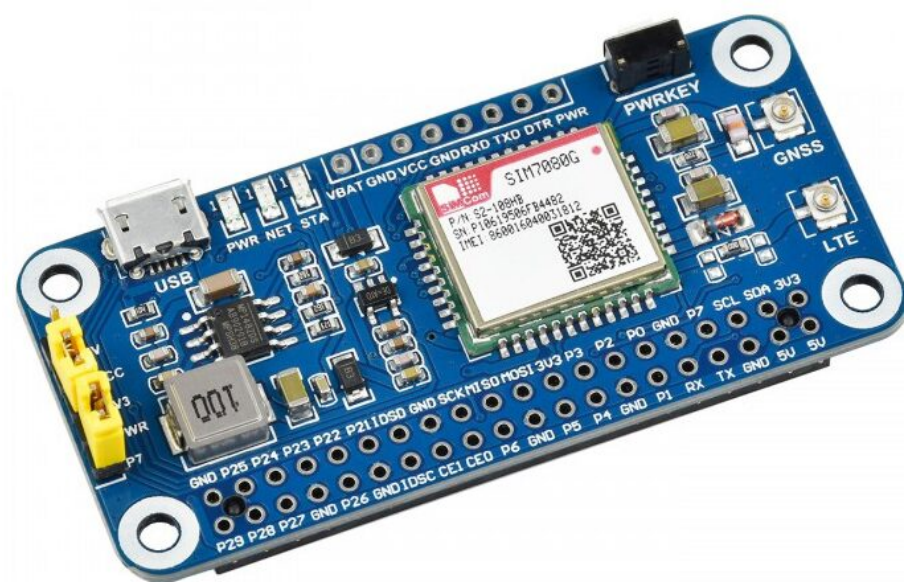
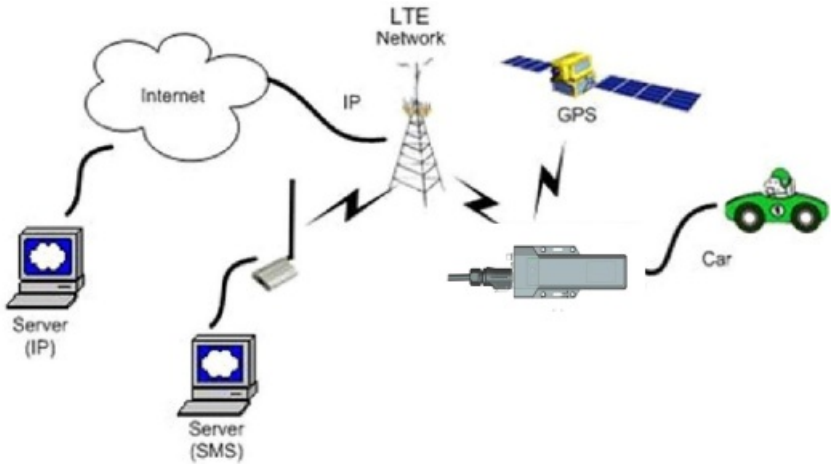


Introduction

The device comes pre-configured from the factory. It is ready to use. The SIMBA appears to a user or a server application as an endpoint device. It can be queried, updated and configured either through a serial connection, an over-the-air IP connection or through SMS messaging. The SIMBA presents itself over these connections as an enhanced cellular modem with attached functional elements. These elements include:

- GPS location engine
- Accelerometer
- Input/outputs dedicated for ignition, relay, buzzer, and general-purpose
- Serial UART port
- Timers
- Watchdog lockup protection
- Power management
- Event reporting
- Voltage monitoring

Access to these elements and general-purpose interface is done through an extended AT command set. Configuration parameters are stored to flash memory and are automatically used on the next power up event. For more details, please reference the AT Command document.



Hardware Design

Basic Hardware

Cellular Modem	Based on Quectel BG96 Module
Cellular Antenna	Internal single antenna
GPS Antenna	Dedicate high performance ceramic antenna
UIM requirement	Support 3FF SIM Interrupt Mode No Support Hot Plug/Unplug
Battery Monitor	Internal analog input
Build in battery manager	Yes
Interface	Debug UART
	12V DC Input Ground
	Relay Drive (Open Drain , 500mA current)
	Dedicated Output for buzzer control
	Ignition Input
	GPIO
Dedicate Timers	Yes
Watchdog	External HW via MCU
Motion Detect	Supported GPS/G-Sensor
LED	3 LED Supported 1- RED; 1- Green;1-Orange
Battery	built in battery 4400mAH Lion
Working Time	6 months
Power switch	No
Power Cable color	4 or 6 colors
Power Cable connector type	12-pin connector+5pin
Power Consumption	< 5Watts

The SIMBA provides support for specialized hardware features through extended AT commands.
The features supported include the following:

Accelerometer

The accelerometer can be used for motion detection and driver behavior monitoring.

Remote Update
The SIMBA supports OTA field upgrades of the resident application. An over the air FTP connection is made over an IP connection. A replacement file is then transferred from a server to the SIMBA and that file replaces the

previous application image.

Power Modes
The SIMBA device supports several power modes that are set by AT commands. In full power mode the GPS is active and the cellular subsystem will maintain a persistent cellular connection whenever service is available. IP connection is maintained according to the configuration of the device. The device can be put in low power mode whenever it runs on a backup battery or if the external battery is low or if it is not moving. In low power mode the GPS is not running and the LED's are off. The device would return to full power whenever an event occurs that triggers a report.
Those events include:

- Periodic report
- GPIO change
- IP change
- Battery threshold
- Heartbeat
- Watchdog
- Power-up
- Ignition
- Trip start and stop

Any hardware or software reset will return the device to full power mode.

Test Method

Hardware

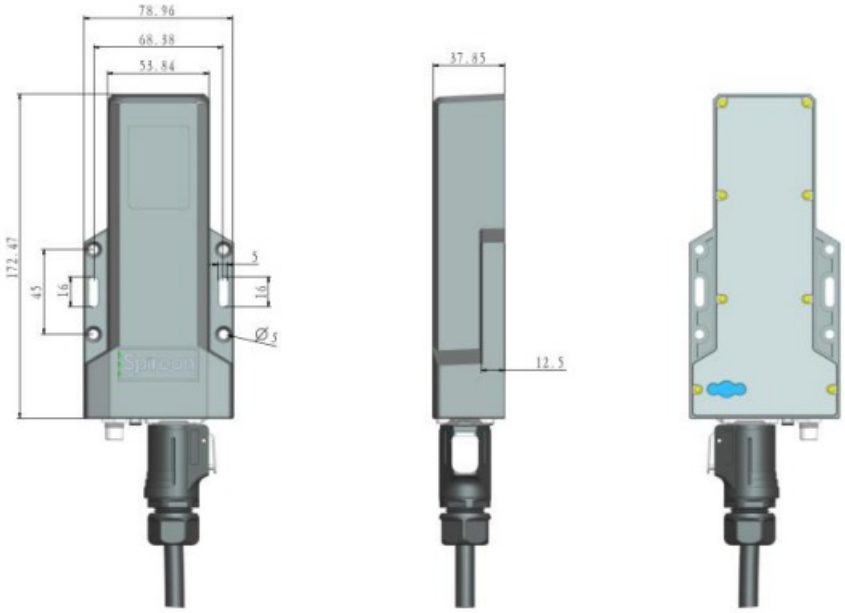
Test Item	Description
Baseband Function Test	• Power Input Test • Power Consumption and Current Test • Heat Dissipation Test • UART Stability Test • GPIO Level Test • LED Stability Test • Drop Down Test • ESD Test • High/Low Temperature Test • Humidity Test
RF Test	• RF Performance Test • GPS Performance Test • Antenna Performance Test

Software Test

Test Environment Construct

1. **Message Test environment**
    1. USB dongle and PC as message server
    2. Send message to SIMBA
2. **UDP Test environment**
    1. Connect dongle to PC and create dialup as ip server
    2. SIMBAcreate IP connection to server
3. **UART Test environment**
    1. Connect SIMBAto PC with com serial cable
    2. Open Terminal tool and send at command
    3. Response can be shown at terminal window

SIMBA Mechanical Structure (mm)



FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure Information

This device meets the government's requirements for exposure to radio waves. This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government**.**
This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.

ISED Notice

This device complies with Innovation, Science and Economic Development Canada license-exempt RSS

standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference
2. This device must accept any interference, including interference that may cause undesired operation of the device.
3. This device complies with the Canadian ICES-003 Class B specifications. CAN

ICES-3(B)/ NMB-3(B)
IC: 22952-FLF2M

ISED RF Exposure Statement
This device complies with ISED RSS-102 RF exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the IC RSS-102 RF exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.

Documents / Resources

	Spireon SIMBA2 CAT-M Wireless Communication Device [pdf] User Manual FLF2M, O9YFLF2M, SIMBA2, CAT-M Wireless Communication Device, SIMBA2 CAT-M, Wireless Communication Device, SIMBA2 CAT-M Wireless Communication Device, Communication Device